To: Hop Brook Protection Association

From: SOLitude Lake Management
590 Lake Street
Shrewsbury, MA 01545

RE: Special Conditions Requirements - Order of Conditions #301-1283

Introduction

The Order of Conditions, granted by the Town of Sudbury Conservation Commission and the Massachusetts Department of Environmental Protection (MA-DEP), states that a letter shall be provided to the Sudbury Conservation Commission listing potential impacts to non-target native vegetation, water quality, and aquatic wildlife, as well as treatment maps.

Survey Report

SOLitude Lake Management visited the Hop Brook Ponds on June 10, 2020. At first glance, each pond had evident growth of dense vegetation and moderate floating mats of filamentous algae. Grist Mill was accessed by road, where a canoe was launched at the dam. Carding Mill was accessed through a gate off Dutton Road where a canoe was used to tour the pond and Stearns Mill was accessed at a parking area adjacent to the dam where a canoe was used to tour the pond. It was determined that the vegetation was too thick for a motored boat.

Grist Mill Pond (Figure 1)

Grist Mill Pond was visited first. Water chestnut (*Trapa natans*), waterweed (*Elodea spp.)*, snail-seed pondweed (*Potamogeton bicupulatus*), greater duckweed (*Spirodela polyrhiza*), small duckweed (*Lemna minor)*, watermeal (*Wolffia spp.*), variable watermilfoil (*Myriophyllum heterophyllum),* coontail (*Ceratophyllum demersum)*, and curly-leaf pondweed (*Potamogeton crispus)* was observed at this time. Water chestnut covered roughly 80% of the surface, mixed in with the floating-leaf duckweed and watermeal species. Waterweed, snail-seed pondweed, and coontail were all present relatively close to the launch area along the shoreline while curly-leaf pondweed was present throughout the whole pond growing alongside the water chestnut. Minimal open-water was observed.

Carding Mill Pond (Figure 2)

Carding Mill Pond was visited after Grist Mill. Water chestnut (*Trapa natans*), waterweed (*Elodea spp.*), small duckweed (*Lemna* minor), greater duckweed (*Spirodela* polyrhiza), and curly-leaf pondweed (*Potamogeton crispus*) were observed at this time. Water chestnut covered roughly 65% of the water surface and curly-leaf was sparse to moderate, covering roughly 70% of the surface. Floating-leaf duckweed and watermeal filled in the remaining space. Roughly 20% of open water was observed.

Stearns Mill (Figure 3)

Stearns Mill was visited last as directed in the Order of Conditions. Water chestnut (*Trapa natans*), curly-leaf pondweed (*Potamogeton crispus*), variable-leaf watermilfoil (*Myriophyllum heterophyllum)*, coontail (*Ceratophyllum demersum*), small duckweed (*Lemna minor*), greater duckweed *(Spirodela polyrhiza*), watermeal (*Wolffia spp.*), yellow waterlily (*Nuphar* variegata), and leafy pondweed (*Potamogeton foliosus*) was observed at the time of the survey. Water chestnut was prevalent, covering roughly 70% of the water surface, followed by sparse to moderate curly-leaf pondweed. Thick patches of coontail made paddling difficult. The floating-leaf duckweed covered the remainder of the water surface. Roughly 20% of the water surface was opened and not covered by vegetation.

Impacts to non-target aquatic vegetation and wildlife

The impacts of non-management of invasive, aquatic vegetation in the Hop Brook Ponds is highly detrimental to the overall well-being of the ponds. Dense growth of submersed aquatic vegetation in all three ponds made visual observations of both submersed vegetation and aquatic wildlife difficult. Water chestnut, in particular, contributes little to the overall health of the waterbody, harming water quality, the denser the infestation becomes. Water chestnut's floating rosettes and submersed leaves cause warmer water temperatures by restricting water flow and available oxygen and limiting habitat for native vegetation and aquatic wildlife; in particular fish, to create spawning areas. In addition, due to the thick density of water chestnut in the three ponds, the amount of biomass that dies off in the fall is a great burden to the beneficial bacteria within the organic matter of the pond. Therefore, organic matter becomes thicker each year as the bacteria is unable to keep up with the load of biomass. Curly-leaf pondweed is also quite prevalent in all three ponds. Due to the particular life-stage of curly-leaf pondweed, it is the first submersed plant to develop as soon as ice melts in the spring. This is an advantage to this plant, as it can infest areas where native vegetation once grew; however, it's life-cycle is short and it will succumb to warm water temperatures and drop from the water column by mid-summer. This stage causes mid-summer decrease in oxygen levels as the loss of biomass causes rapid oxygen use. A rapid drop in available oxygen can be harmful to aquatic wildlife and can often cause fish-kills. Curly-leaf pondweed has several means of reproduction, including rhizomes, turions, and fragmentation. Turions and fragmentation are the primary means of reproduction of curly-leaf pondweed. The turions are borne on the plant in late May-early June. When the water reaches a certain temperature, the plant senesces and the turions drop to the bottom, where they re-sprout into a new plant. This new plant sits on the bottom through the winter awaiting ice-out the next spring.

The active management impacts to non-target vegetation and aquatic wildlife during the first year of management by means of herbicide applications includes the potential for a decrease in oxygen by reduction of biomass. There is also potential that the herbicide could impact floating-leaf species such as duckweed and waterlily. However, the result of reduction in water chestnut and curly-leaf pondweed within the water column and at the surface provides open-water habitat for aquatic wildlife to freely swim through the water column. In addition, water flow is restored, cooling water temperatures allow oxygen to once again saturate the water column. Once oxygen is restored to the water column, the beneficial bacteria can continue degrading organic matter.

As described above, the impacts to non-target vegetation and aquatic wildlife are higher if no-management is performed at the Hop Brook Ponds.